1. Introduction
2. Background
   1. Paxos

* An algorithm for implementing fault-tolerant distributed systems.
* The heart is a consensus algorithm – how do we get multiple processes that are each trying to assert/propose a value to agree upon and stick with a single value?
* The safety requirements:
  + Only a single value that has been proposed may be chosen
  + Processes learn about values if and only if they have been chosen
* The protocol does not specify any liveness/convergence requirements.
* There are 3 classes of “agents” that take part in the protocol:
  + Proposers – They propose values to be chosen
  + Acceptors – They choose to or not to accept proposed values
  + Learners – They learn the final, single proposed value that was accepted by the acceptors (not all, just a majority, see below)
  + There are no strict requirements on the mappings between the given processes and these roles
* A proposed value can be considered accepted once a majority of acceptors have accepted it.
* The cornerstone of the algorithm lies in determining how and which value must be accepted.
* From a bird’s eye perspective, the acceptors control the proposers and their proposed values – so the working of the algorithm is driven by acceptors forcing the proposers to propose acceptable values, whilst the design of the algorithm revolves around setting down rules for how to accept values.
* The design considerations for accepting values are as follows (revised as new requirements emerge:
  + 1. An acceptor must accept the first proposal it receives – we must begin somewhere
  + Only a single value must be accepted => we’ll turn this around and instead put the responsibility on the proposers and say – only that value may be proposed repeatedly
  + As a proposer, I can see what values have been accepted while proposing, but I cannot predict what values might be accepted in the future. To this end, I somehow seek to control the future acceptances by extracting promises from acceptors regarding the nature of the same
    - Proposals now have a proposal number. To avoid confusions, different proposals must have different numbers, a global ordering of sort – the implementation left open ended.
    - Promise to me, the proposer that you, the acceptor will not accept a proposal with a number lower than mine
    - If you have already accepted a proposal, let me know.
  + Due to this extracted promise, we need to change acceptance rule 1 to: 1a. Acceptors can and must only accept proposals that do not violate promises it has made => accept proposals which have numbers > numbers of proposals to which promises have been made
  + 2. If a proposal with value ‘v’ is chosen, then every higher numbered proposal that is chosen by any acceptor has value ‘v’ – this follows from the requirement that only a single value be chosen in a round of Paxos.

1. Design and Implementation
2. Experimental Methodology and Results
3. Conclusion